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THE EFFECTS OF FIRM CHARACTERISTICS ON INVESTOR REACTION TO IT INVESTMENT ANNOUNCEMENTS

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Abstract

This paper examines the effects of firm characteristics measured by price-to-book (PB) ratio, free cash flow (FCF), and variability of daily stock return (VDR) on investor reaction in the stock market to IT investment announcements. In contrast to previous studies, which focused exclusively on whether or not IT investment announcements led to an abnormal return in the market, this study investigates the extent to which firm characteristics influence the direction and magnitude of cumulative abnormal returns (CARs). Although these firm characteristics critically affect investor reaction to IT investment announcements, existing event studies in the IT literature pay scant attention to them. In spite of the same IT investment (say, developing an ERP system) announcement, the market reaction would vary due to the heterogeneity in financial situations under which the firm operates before the announcement.

Contrary to previous studies, the results suggest that IT investment announcements result in significant abnormal returns around the event announcement date when only the announcements made by investing firms were considered. We provide some empirical evidence that investments in IT can have a great impact on firm value. With regard to the firm characteristics in relation to CARs, PB ratio, and variability of daily stock returns significantly affect the investors' reaction to IT investment announcements. Finally, this study shows IT investment decision makers the implications of drawing greater attention from investors when making IT investment announcements.

Keywords: IT investment announcements, firm characteristics, cumulative abnormal return, event study.

INTRODUCTION

Over the past few years, the contribution of investments in information technology (IT) to firm performance has drawn much attention in the IT community (Barua et al. 1995; Bharadwaj et al. 1999; Brynjolfsson and Hitt 1996; Lucas 1999; Weill 1992). Nevertheless, many IS researchers have debated the measurement issue pertaining to payoffs of IT investments (Brynjolfsson and Hitt 1998). Some consider accounting-based measures such as return on investment or assets inadequate, since these tools can only capture the quantifiable benefits while structurally omitting the intangible ones, such as organizational learning, quality improvements, and timeliness (Benaroch and Kauffman 1999). As a result of such methodological shortcomings, the effects of IT on firm performance have been generally inconclusive.

Recently, a number of IS researchers employed event-study methodology to explore how the stock market values a particular IT investment (Dos Santos et al. 1993; Im et al. 2001). Analyzing investor reaction to the announcement in the stock market, the event study methodology assesses the extent to which IT investment announcements positively affect the firm's market value. If investors react positively to the IT investment announcement, a positive abnormal return, defined as a risk-adjusted return in excess of the expected stock market return (Subramani and Walden 2000), is the likely consequence around the announcement date.

As opposed to the firm-level accounting approach, the event study focuses on the relationship between IT investments and firm value at the market-level and employs stock market valuation as an alternative measure of business performance (Brynjolfsson and Yang 1997; Im et al. 2001). Based on the stock market's valuation, the event study provides a unique setting for IS researchers to investigate the impact of IT investment announcements on the firm's future profitability (McWilliams and Siegal 1997).

In contrast to the commonly held belief, contemporary IT event studies reveal that IT investment announcements do not significantly alter investor perception on the firm's market value around the event date.[1] These studies typically sample a large number of IT investment announcements from publicly available sources and measure the cumulative abnormal returns (CAR) to determine if IT investment announcements result in significant stockholder reactions.

The present study extends prior work by exploring CARs in relation to firm characteristics. Previous studies have focused exclusively on the question of whether IT investment announcements lead to an abnormal return in the market, but this study investigates the extent to which firm characteristics, measured by price-to-book ratio, free cash flow, and daily stock return volatility, influence the direction and magnitude of the CARs. Although these firm characteristics critically affect investor reaction to IT investment announcements, existing event studies tend to pay them scant attention. In spite of the same IT investment (say, developing an ERP system) announcement, the market reaction might vary due to the heterogeneity of the financial situations under which the firm operates before the announcement.

In the following section, we explore the impact of firm characteristics on the CARs and generate hypotheses. The third section introduces our research methodology, including data sampling procedures and test measures. Our results are then presented and discussed.

HYPOTHESES DEVELOPMENT

According to the efficient market hypothesis (Fama 1970), investors in the stock market adjust their beliefs with respect to the firm's value when new information pertaining to the firm's operation is publicly released. In that respect, any corporate news that significantly affects the firm's current business operation, such as new investments in plants or technology or a hire or retirement of key executives, influences investor perception of the particular firm's market value.

An investment in IT becomes publicly available information when it is voluntarily released to the media by company management or a third-party information discloser such as financial analysts or IT service providers. In the market, stockholders react favorably to an IT investment announcement if they believe such an investment generates a substantial amount of cash flow for the investing company in future periods.

However, investor reaction to an IT investment announcement might vary due to heterogeneity in firm characteristics. Previous studies in accounting and finance used firm characteristic variables such as free cash flow (FCF) and price-to-book (PB) ratio to account for differences in the market reaction to the corporate investment announcements. For example, Burton et al. (1999) employed FCF and PB ratio in relation to three different types of capital investments, but found no significant impact of these variables on the market reaction. On the other hand, Chung et al. (1998) found that PB ratio, a measure of a firm's growth opportunity, is the primary determinant of market reactions to capital expenditure decisions. In Keown et al. (1999) and Chan et al. (1995) revealed that FCF is significantly associated with the market reaction to joint venture and business relocation announcements, respectively.

These mixed results suggest that, despite identical IT investment announcements, investors may react differently because of differences in firm characteristics. In this paper, we use the three firm characteristic variables, price-to-book ratio, free cash flow, and variability of daily stock returns, to determine if the market's reaction to an IT investment announcement is associated with the financial conditions under which the firm operates prior to the announcement. In what follows, firm characteristic variables are articulated in light of the CAR and hypotheses developed accordingly.

[1]Subramani and Walden (2001) and Chen and Siems (2001) found significant CARS, but these studies examined specifically the market reaction to e-commerce initiatives and not general IT investments.

Price-to-Book Ratio

Price-to-book (PB) ratio, calculated by dividing the current common stock price by book value of a firm per share, shows how investors value the price of common stock in relation to a company's book value. In general, PB ratio indicates investor expectation of the company's potential to grow: a high PB ratio means that investors believe the firm has the high potential to grow, while a low PB ratio suggests that investors have little expectation of a firm growing.

Investors respond positively to IT investment announcements when the investment is expected to enhance the company's growth and generate substantial future cash flow. We predict that investor reaction to IT investment announcements is inversely related to a firm's PB ratio. Given that firms with high PB ratio have already reached critical mass in their operational efficiency, investments in IT will bring only marginal efficiency at best and have a limited effect on the firm's growth potential.

Conversely, a firm with low PB ratio can greatly benefit from IT investment that is expected to radically change the firm's current business operation and multiply the firm's potential to grow. The impact of IT investment would be much larger on firms currently not performing well, where investors do not expect high growth potential in future periods. In fact, numerous studies have found that IT investments play a significant role in firms faced with a great deal of inefficiency in their operations (Clemons and Row 1991; Mukhopadhyay et al. 1995).

As the impact of IT investments on the firm's growth potential is limited, investors are less willing to react to an IT investment announcement made by high PB ratio firms. By the same token, investors should react more positively to an IT investment announcement made by low PB ratio firms due to the greater impact of IT investments. Consequently, the CAR around the announcement date of IT investments should be relatively smaller in firms with high PB ratios than in firms with low PBratios.

Hypothesis 1: *A firm's PB ratio, which indicates the firm's potential to grow, is inversely related to investor reaction to IT investment announcements.*

Free Cash Flow

Free cash flow (FCF) refers to the amount of discretionary cash flow that a business has at its disposal at any given time after deducting operating costs, interest payments on bank loans and bonds, salaries, research and development, and other fixed costs. This construct has been widely used in the agency cost literature. Drawing from traditional agency theory, Jensen (1986) argues that there is a great deal of conflicting interest between shareholders and management about the amount of free cash flow managers hold.

To increase their bargaining power against shareholders, managers, the agents of shareholders, wish to increase the resources under their control while limiting the payouts to shareholders (Jensen 1986). At the extreme, managers can even be willing to invest in projects that have no positive net present value (NPV). Those managers who waste firm resources by investing in non-positive NPV projects certainly do not fulfill their responsibility of maximizing the shareholders' value. Consequently, if firms hold substantial free cash flow in their hands without either distributing it to investors in dividend payments or investing in other value-creating projects, the agency costs between the two conflicting parties increase severely.

By reducing free cash flow, IT investments can diminish the agency cost and confer a positive signal to investors. Importantly, compared to other short-term cash-generating investments such as advertising, IT investments are generally considered long-term investments that help businesses streamline their operations and generate returns after a few years of lag time. Therefore, moving free cash into IT projects may signal to investors the managers' intent for future growth, which encourages them to respond positively in the market.

However, investors should react more strongly to an IT investment announcement made by firms with high FCF. Similar logic explains such a linear relationship. Investors should react more positively to an IT investment announcement made by firms with high FCF than by those with low FCF, because the magnitude of reduction in agency costs for a given IT investment is expected to be larger in the former than in the latter. Therefore, the CAR is positively related to the amount of FCF managers hold.

Hypothesis 2: *Investor reaction to IT investment announcements is positively related to the amount of free cash flow managers hold.*

Variability of Daily Stock Returns

Variability of daily stock returns (VDR) has been employed to measure risk in finance. VDR indicates the extent of a firm's uncertainty about the stream of future cash flow. This uncertainty is due to a variety of reasons, such as the lack of public information necessary to value firms or inefficient business operations.

An IT investment announcement is expected to decrease the level of uncertainty for a given firm through making more information available to investors or improving the efficiency of business operations. The IT investment announcement signals to investors the management's intention to improve firm performance and provides investors with the useful information for assessing the firm's potential to stabilize. In addition, the IT investment announcement encourages investors to firmly believe that the underlying investment produces substantial future cash flow for the investing firm as a result of the improved operational efficiency.

Consistent with the logic applied to PB ratio and FCF, IT investment announcements are predicted to make a greater impact on firms with a high degree of uncertainty. By the same token, IT investment announcements should have limited influence on firms that are already stable in generating future cash flow. Since the investment in IT plays a relatively larger role in firms with high uncertainty than in those with low uncertainty, the CAR is positively related to the degree of VDR.

Hypothesis 3: *Investor reaction to IT investment announcements is positively related to the degree of variability in daily stock return (VDR)*

RESEARCH METHODOLOGY

Keyword Search

Data were gathered from Lexis-Nexis, which maintains a large volume of both current and historical business news. A number of keywords were utilized that represent current IT practices widely used in various industries. To complement previous studies that employed the keywords reflecting only "pure" IT investments, such as a purchase or development of hardware/software and communication networks, we more broadly redefined IT investments to include more complex and current IT practices such as IT outsourcing arrangements and mission critical applications (for example, ERP, Intranet/Extranet, etc.).

Since the vast majority of firms today use these IT practices to create IT infrastructure and acquire necessary IT labor, a firms' engagement in these IT initiatives should be considered an IT investment. According to a report by *InformationWeek* (Caldwell 1998), 92% of major corporations outsource their IT operations instead of conducting in-house developments, which suggests that IT investments are made heavily through these outsourcing arrangements.

Data Description

Lexis-Nexis generated nearly 5,000 news announcements from the keywords we employed during the six-month period between July, 1999, and December, 1999. We hired five MBA students who initially filtered 5,000 news articles and identified those related solely to IT investment announcements. Largely due to technical inaccuracy in search capability, Lexis-Nexis produced a large number of irrelevant news events that were eliminated during these initial sorting processes. To ensure data quality, one of the authors validated the initially selected news events (N = 206) individually. Despite a substantial number of initial samples, only 141 events were included in the final sample.

We gathered data on price-to-book (PB) ratio and free cash flow (FCF) from COMPUSTAT and daily stock returns from the University of Chicago's Center for Research in Security Prices (CRSP). Price-to-book ratio is computed as follows:

$$\text{PB} = \frac{\textit{monthly close price} \times \textit{quarterly common shares outstanding}}{\textit{quarterly common equity}}$$

The denominator includes common stocks, capital surplus, and retained earnings, representing the common shareholder's interest in the company. Since the components of PB ratio are only available quarterly, we used the quarterly data closest to the

announcement date. For example, if the IT investment was announced on October 17, we used the third quarter data (from July to September) to compute PB ratios. We formulated free cash flow (FCF) as follows:

FCF = operating activities – cash dividend – capital expenditures

Similar to PB ratios, we used the closest quarterly data to calculate FCFs.

The variability of daily stock returns (VDR) was calculated for each firm by averaging the variance of daily returns during the period of –110 to –10 (–110 indicates 110 days prior to the event date). To control for the size effect, we took a natural log of the firm's total asset. Finally, we used the dummy variable to identify the discloser effect.

Cumulative abnormal returns (CARs) were computed based on the same procedures employed by Dos Santos et al. (1993). The market model used to calculate abnormal return is as follows:

$$R_{jt} = \alpha_j + \beta_j R_{mt} + \epsilon_{jt}$$

where R_{mt} = rate of return on the equally weighted market portfolio on day t,
R_{jt} = rate of return for firm j on day t,
α_j, β_j = intercept and slope parameter for firm j, respectively
ϵ_{jt} = error term for firm j on day t.

First, we estimated the parameters ($\hat{\alpha}_j$ and $\hat{\beta}_j$) of α_j and β_j for the market model above using the daily stock return data during the period of –200 to –30 (0 is the IT announcement date). Second, we calculated the abnormal returns (A_{jt}) for each firm by subtracting the returns around the IT announcement date from the expected returns based on the market model,

$$A_{ij} = R+jt - (\hat{\alpha}_{jt} + \hat{\beta}_{jt} R_{mt})$$

The average abnormal return (AAR_t) is the sample mean:

$$\mathbf{AAR_t} = \sum_{j=1}^{N} A_{jt} / \mathrm{N}$$

Where t is defined in trading days relative to the event date.

For the period of the test, the cumulative average abnormal return is:

$$\mathbf{CAR_{(t1,t2)}} = 1/\mathrm{N} \left(\sum_{j=1}^{N} \sum_{t1}^{t2} A_{jt} \right)$$

Where t_1 is the beginning trading day and t_2 is the ending trading day for the period

The prior studies employed the standardized abnormal return method, which calculates Z-statistic using the standard abnormal return for each firm on day t, to examine the significance of CAR around IT investment announcements. Instead of the standardized abnormal return method, the current paper employs the time series standard deviation method,[2] which calculates a single variance estimate for the entire portfolio. The time series standard deviation method avoids the potential problem of cross-sectional correlation of security returns. The estimated variance of AAR_t is

$$\hat{\sigma}^2_{AAR} = \sum_{e1}^{e2} (AAR_t - \bar{\bar{AAR}})^2 / D - 2$$

where the market model parameters have been estimated over the D days *e*1 through *e*2,

[2]The time series standard deviation method has been used in many event studies, such as Brickley et al. (1991) and Dopuch et al. (1986).

$$\overline{\overline{AAR}} = \sum_{t=e1}^{e2} AAR_t / D$$

The test statistic is

$$t = AAR_t / \hat{\sigma}_{AAR}$$

for the average abnormal return or,

$$t = CAR_t / (t_2 - t_1 + 1)\ (t_2 - t_1 + 1)^{1/2}\ \hat{\sigma}_{AAR} \text{ for CAR}$$

where t_1 is the beginning trading day and t_2 is the ending trading day for the period.

RESULTS

The Market Reaction to IT Investment Announcements

Table 1 shows the market's reaction to IT investment announcements measured by the cumulative abnormal return (CAR). The abnormal return is calculated by employing the market model described above $(R_{jt} = \alpha_j + \beta_j R_{mt} + \epsilon_{jt})$. Table 1A displays the CARs for three windows: (1) five days before the announcement to two days before the announcement (*pre-event period*), (2) one day before the announcement to the announcement date (*event period*), and (3) one day after the announcement to five days after the announcement (*post-event period*). While we did not discover significant cumulative abnormal returns around the event date (CAR = 0.42%, $t = 0.83$), we did find the significantly positive cumulative abnormal return during the pre-event period (CAR = 2%, $t = 2.75$). These results are consistent with prior studies (Dos Santos et al. 1993; Im et al. 2001).

Table 1. Abnormal Return Around IT Investment Announcement
(Full Sample)

A. Cumulative Abnormal Returns		
Window	**Cumulative Abnormal Return (%)**	**t-value**
(-5, -2)	1.99	2.75 **
(-1, 0)	0.42	0.83
(+1, +5)	0.96	1.19
B. Average Abnormal Returns		
Day	**Average Abnormal Return (%)**	**t-value**
-5	0.26	0.72
-4	0.46	1.28
-3	0.12	0.33
-2	1.16	3.19**
-1	-0.31	-0.85
0	0.74	2.03*
1	-0.03	-0.09
2	0.06	0.16
3	0.47	1.29
4	-0.08	-0.22
5	0.55	1.53

0: announcement date, **: significant at 0.01, *: significant at 0.05

Table 2. Abnormal Return Around IT Investment Announcement
(Announcements made by the investing firms)

A. Cumulative Abnormal Returns		
Window	**Cumulative Abnormal Return (%)**	**t-value**
(-5, -2)	1.7	1.77
(-1, 0)	1.36	2.00*
(+1, +5)	-0.08	-0.08
B. Average Abnormal Returns		
Day	**Average Abnormal Return (%)**	**t-value**
-5	0.37	0.78
-4	0.51	1.06
-3	0.08	0.17
-2	0.73	1.52
-1	-0.22	-0.45
0	1.58	3.28**
1	0.09	0.18
2	0.13	0.26
3	-0.05	-0.32
4	-0.61	-0.27
5	0.47	0.97

0: announcement date, **: significant at 0.01, *: significant at 0.05

However, our results suggest an interesting phenomenon: the CARs are significantly influenced by discloser information (Table 2A). *When we test the model with the IT investment announcements made only by the investing firms, we find the significant CARs around the event period (CAR = 1.36%, t = 2.0).* It appears that investors react differently based on who makes the IT investment announcement. This surprising result is explained in depth later.

We calculated the average abnormal return (AAR) per day during the period of –5 to +5 (Table 1B). The results suggested that the average abnormal return on the event date and two days before the event date were positively significant (AAR = 0.74% at 0 day, t = 2.03; AAR = 1.16% at –2 day, t = 3.19). Generally, assuming that there was no information leakage prior to the announcement date, positively significant abnormal returns were expected only during the event date (Foster 1977). Therefore, the significantly positive reaction at –2 is surprising and worth considering.

We speculate several possible sources for this phenomenon. One possibility is the timing of information delivery to the market. Although the media released the IT investment announcement at the event date, that information might have been leaked before the public announcement. Large shareholders or management, who have better access to inside information, might have obtained the information before the public release. If the market had followed the similar trading pattern of these large shareholders, it might have reacted a few days before the public announcement. Unfortunately, since no inside information is available, proving our speculation empirically is difficult.

However, to investigate the significant market reaction two days before the event date, we perform the following analyses. First, to eliminate any confounding effects, we looked into Lexis-Nexis to see if the firms in the sample had other news releases during the period of –5 to 0. Obviously, earning announcements, mergers and acquisitions, and retirements of CEOs could affect the puzzling phenomenon. However, even after eliminating the confounding data, we found similar results: the average abnormal return was significant around the event period (–2 and 0).

Second, we divided the IT investment announcements into two categories based on who made the IT investment announcement. The first category consisted of IT investment announcements made only by investing firms, whereas the second included

announcements made by IT service providers or financial analysts. Note that IT service providers have incentives to release IT contracts to the media to encourage positive impacts on their own stock prices. Investing firms might not announce such contracts when information has already been released in the market by third parties or when they believe the announcements affect their stock prices either not at all or negatively. Assuming that investors generally perceive IT investments as positive news, we conjectured that the first explanation was more plausible.

Table 2 shows the abnormal returns for the announcements made only by investing firms. To a large extent, the results were consistent with our prediction. The CAR around the event period was positively significant (CAR = 1.36, t = 2.0), as is the average abnormal return on the event date (CAR = 1.58, t = 3.28). Interestingly, the significant AARs observed two days prior to the announcement date disappeared when the announcements made only by the investing firms were used.

The Effects of Firm Characteristics on the CAR

We developed a regression model to test the three hypotheses. The CAR was used as the dependent variable, while PB ratio, FCF, VDR, discloser information (DIS), and firm size (TA) were used as independent variables in the model. We included the firm size variable (TA) to control for the firm size effect.

$$CAR_i = \alpha + \beta_i DIS_i + \beta_2 PB_i + \beta_3 FCF_i + \beta_4 VDR_i + \beta_5 TA_i + \epsilon_i$$

where i is an individual firm;
CAR is the cumulative abnormal return during the event period;
DIS is 1 if the IT investment is announced by investing firms, otherwise 0;
PB is price-to-book ratio;
FCF is free cash flow;
VDR is variance of daily stock returns;
TA is a log of total asset.

Before we began the regression analysis, we computed Pearson's correlation to measure the strength of a linear relationship between the variables we used in the model. More importantly, we measured the correlation to determine if a high correlation between variables in the regression model existed. Multicolinearity violates the regression assumption that one independent variable is not a linear combination of the other independent variables, resulting in inaccurate significant levels and β coefficients. None of the correlations between the independent variables in Table 3 were above 0.6, which suggests the non-existence of multicolinearity between our independent variables.

Table 3. Pearson Correlation Coefficients

	C00	C-20	C-10	FCF	TA	PB	DIS	VDR
VDR	.238**	.285**	.145	-.372**	-.572**	.344**	.134	1
DIS	.134	.029	.114	-.048	-.298*	.001	1	
PB	.001	-.108	-.074	.001	-.153	1		
TA	-.131	-.213*	-.089	.308**	1			
FCF	-.126	-.219*	-.098	1				
C-10	.811**	.792**	1					
C-20	.630**	1						
C00	1							

**: significant at 0.01, *: significant at 0.05

- C00: CAR(0,0), C-20: CAR(–2,0), C-10: CAR(–1,0)

Table 4. Test of the Three Hypotheses (Total Sample)

Model: $CAR_i = \alpha + \beta_1 DIS_i + \beta_2 PB_i + \beta_3 FCF_i + \beta_4 VDR_i + \beta_5 TA_i + \epsilon_i$

Variables	Expected Sign	CAR[-1,0](P-value)	CAR[-2,0] (P-value)
Intercept	?	-0.04469 (0.26)	0.0010 (0.98)
FCF	0	0.0078 (0.95)	-0.0288 (0.86)
TA	–	0.0034 (0.40)	-0.0007 (0.86)
VDR	0	11.3980 **(0.02)**	20.6764 (**0.0004**)
PB ratio	–	-0.0011 **(0.08)**	-0.0022 (**0.002**)
DIS	0	0.0189 (0.22)	-0.0029 (0.86)
R-Square		0.06	0.18
F-value(P-value)		1.75 (0.12)	5.51 (0.0001)

Table 4 shows the results of the test. The CARs in two different windows ((–1,0)(–2,0)) are used as the dependent variables. Using different windows to compute CARs is common in event studies. The regression results were similar in the two windows, indicating the insignificance of window effect. The results support our first hypothesis, showing that PB ratio is negatively related to the CAR ($p < 0.05$). The market reaction to IT investments was relatively stronger for the firms with low PB ratio than those with high PB ratio. In addition, we found a statistically significant positive relationship between the VDR and the CAR, supporting our third hypothesis ($p < 0.05$). However, we did not find strong evidence to support our second hypothesis. Although the sign of FCF was consistent with our expectation, it was not statistically significant.

DISCUSSION

Overall, we found mixed results for our hypotheses. The results suggest that:

1. In contrast to previous studies, IT investment announcements have a significant impact on stock prices when announcements made only by investing firms are considered.

2. Investor reaction to IT investment announcements is significant two days before the announcements. We speculate that information leakage before the announcement date might account for this surprising phenomenon.

3. PB ratio and variability of daily stock returns (VDR), which measure the growth potential of a firm and the uncertainty over the future cash flow, respectively, significantly affect investor reaction to IT investment announcements, measured by the CARs.

4. Contrary to our prediction, the amount of free cash flow (FCF) held by managers does not seem to influence the CARs.

In contrast to the results of Dos Santos et al. (1993) and of Im et al. (2001), we found a significant reaction of investors to the announcement by IT investments around the event period. We speculate two possibilities regarding why our results are not consistent with those of earlier studies. First, investors react more positively to the announcements made by IT investing firms than by non-investing firms. In fact, similar to the previous results, we found no excess returns for the full sample, including the announcements by non-investing firms. The significant reactions from investors were observed from the sub-sample that represents the IT investment announcements made only by investing firms. Previous studies might not have taken this discloser factor into consideration. This result suggests that IT investment announcements be made by investing firms in order to have a larger impact on investor valuation on the firm.

Second, the use of different keywords might be attributable to the different consequences. In the keyword selection process, we included terms, in addition to those commonly utilized to refer to pure IT investments, that represent current IT practices widely used in many industries, such as IT outsourcing and ERP. Although no information was available on the size of the deals, we suspect that the contracts made through these arrangements were typically enormous in dollar value. In fact, we conjecture that the size of IT investment grows exponentially over time. IT investments in 2001 should be much larger in scale than those in the

1980s or 1990s even after controlling for inflation, since firms are forced to invest in more costly IT infrastructure lately to develop integrated packages (e.g., ERP, CRM, etc.) and launch large-scale e-commerce initiatives. Consequently, significant positive reactions from investors in our study might result from the size of IT investment contracts.

With regard to the effects of firm characteristics on the CARs, the results partially support our hypotheses that investor reaction to IT investment announcements is significantly influenced by the firm's PB ratio and variability in daily stock returns (VDR). Investors appear to react more positively to the IT investment announcements of firms with low PB ratios and high VDRs. This result suggests that investor expectation with respect to the effects of IT investments is higher for firms that have a higher potential to grow and generate substantial cash flow. On the other hand, due to the limited effects of IT investments, investors tend to undervalue IT investments of firms that have a smaller potential to grow and have already maintained stability in their cash flow streams.

Finally, our study provides IT investment decision makers with some managerial insights into how to draw more attention from investors when making IT investment announcements. To maximize their shareholders' value, managers need to consider who should make the IT investment announcement and under what financial conditions.

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